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(54) **Insertion machine with prioritized selection of inserts**

(57) The inserting machine optimises the final weight of a mailpiece in order to obtain the maximum value from a postal weight category. Each of the enclosure types which may be inserted within the mailpiece is assigned a level of priority eg specifying that it should only be included in mailpieces whose final weight would lie within postal weight categories of less than a specified maximum weight. In addition, each of the enclosure types is assigned a nominal maximum per enclosure weight. A processing unit calculates the nominal weight of the essential enclosures of the mailpiece and the processing unit then selects other enclosure types for insertion within the mailpiece based upon the priority level of the enclosure type and the maximum weight of the enclosure such that the final weight of the mailpiece is substantially equal to a maximum allowable weight threshold for a given postage category. The level of priority of an enclosure can be entered into the system by a variety of means and can further be changed online from one collation processed to the next.

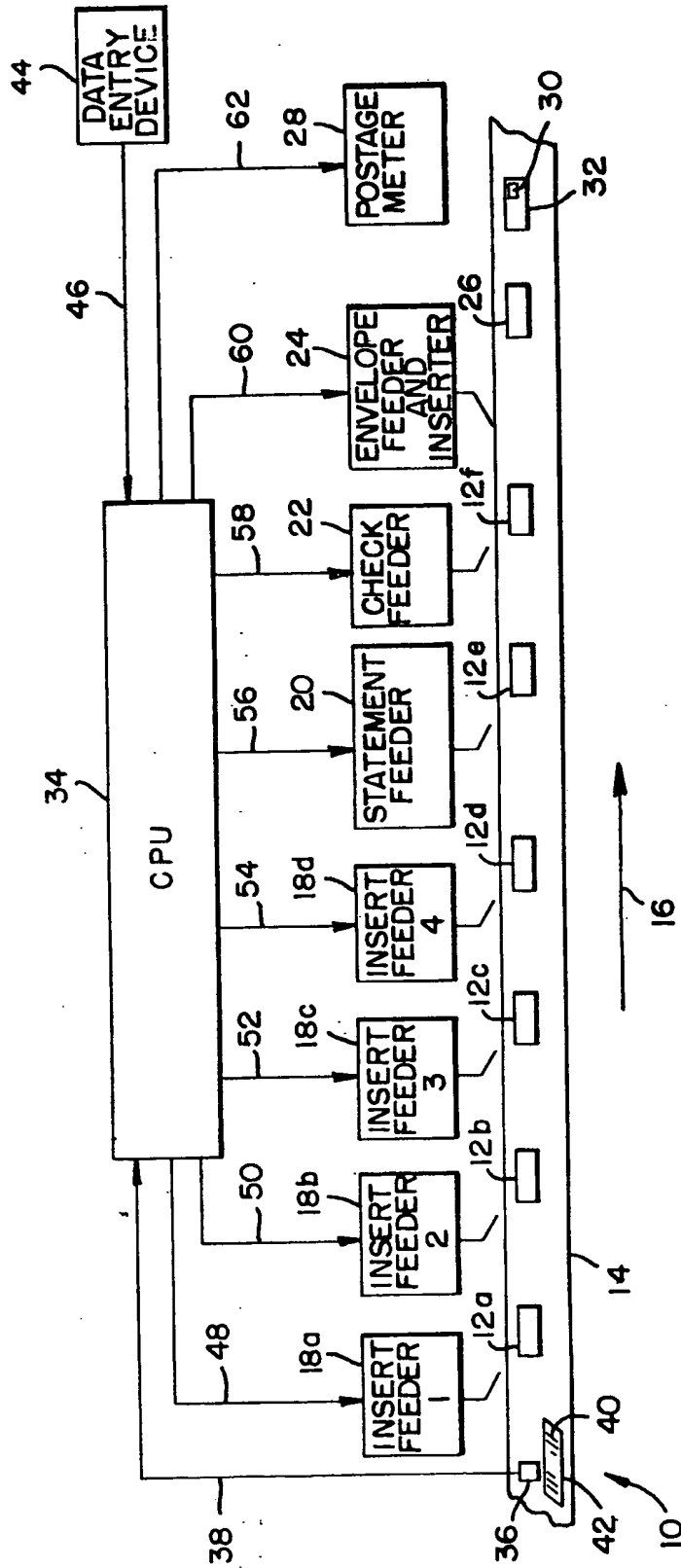GB 2 193 332 A

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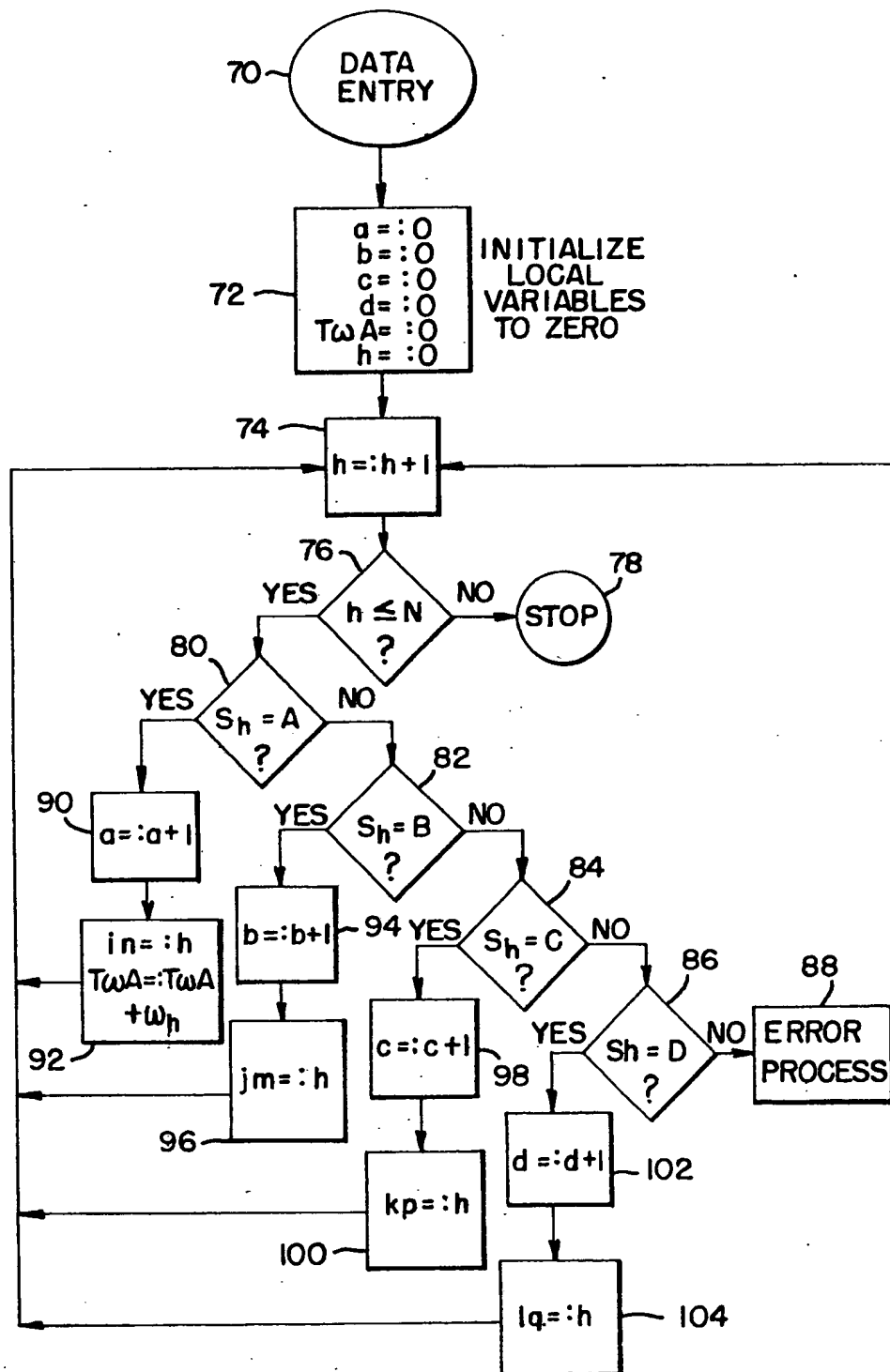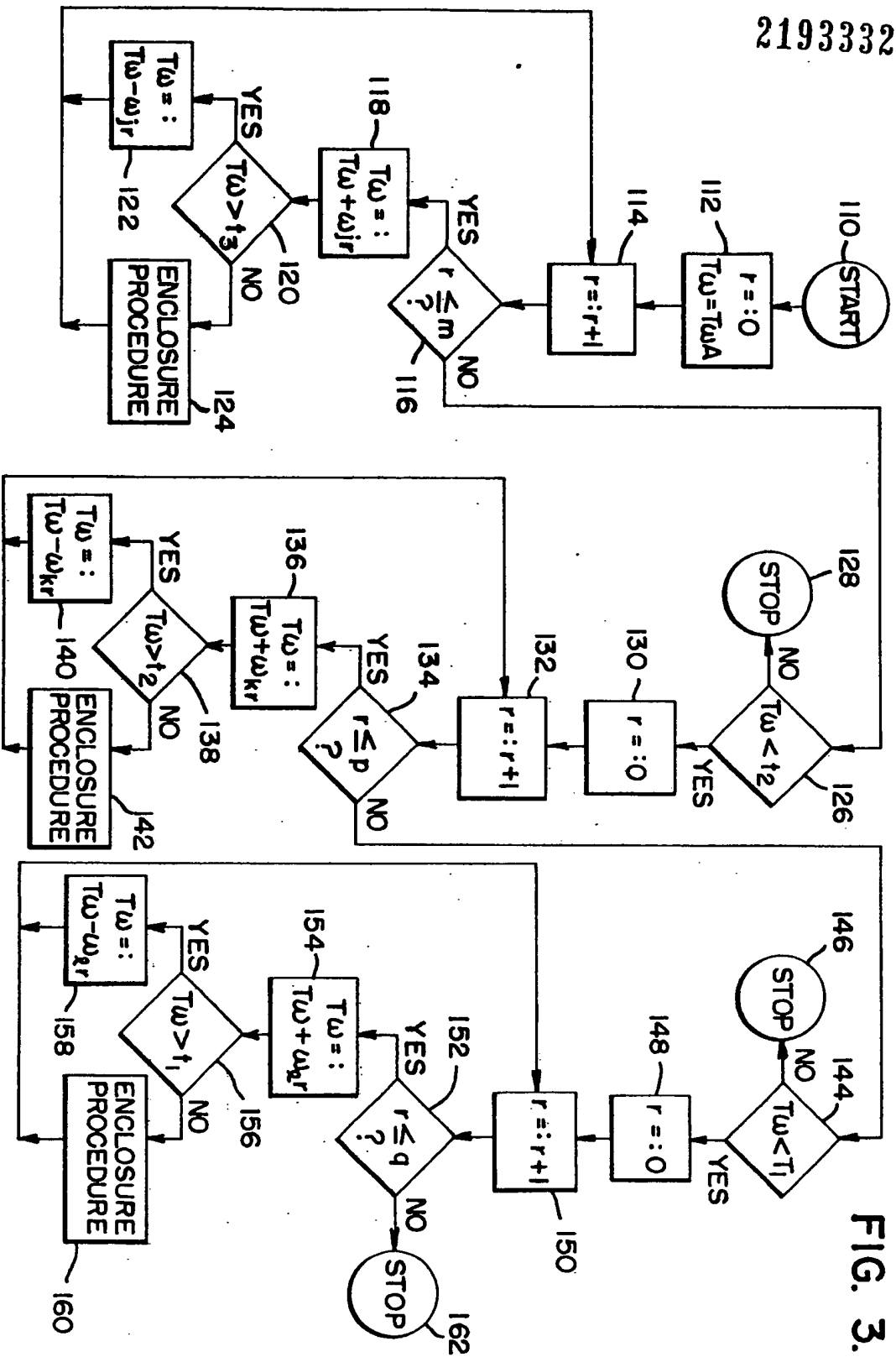FIG. 1.

FIG. 2.

2193332

FIG. 3.

SPECIFICATION

**Insertion machine with prioritized selection
of inserts**

The present invention relates generally to in-
serting machines and, more particularly, per-
tains to an inserting machine capable of mak-
ing an intelligent selection of enclosures based
10 on specific requirements, for example postage
requirements and a user's specific application
requirements.
The invention also relates to a method of
topping off the final weight of a mailpiece, to
15 a method of selectively determining relative to
a value of postage which enclosure types are
to be provided by a mailing system and to a
method of optimising the final weight of a
mailpiece. The invention further relates to a
20 mailing system, and to an inserting machine
which can operate one or more of the above-
mentioned methods.
Multistation insertion machines are widely
utilized for mailing applications wherein a plu-
25 rality of different types of enclosures, such as
advertising enclosures or enclosures of general
or limited interest, are to be included with a
customer's monthly statement. Examples of
such applications are monthly statements
30 mailed by utilities, credit card companies, and
banking or other financial institutions. Included,
typically, with the statement are one or more
enclosures, or inserts, which may convey a
message to the companies customers, such
35 as an offer of additional services, or of a
change in company policy, or advertisements
provided by third parties for inclusion within
the companies monthly mailing.
Illustrative of such inserting machines are a
40 U.S. patent No. 3,935,429, issued January
27, 1976 to George N. Branecky and Gary R.
Sochrim, and a U.S. Patent No. 4,077,181,
issued March 7, 1978 to Leslie K. Asher,
Charles E. Gibson, and Frank T. Roetter, each
45 of the aforementioned Patents being assigned
to the present Applicant. Although well suited
for their intended applications, these and other
known insertion machines of the prior art per-
form their insertion function in accordance
50 with a scheme which is fixed for each piece
of mail processed. That is, in addition to the
required statement and other required docu-
ments which must be inserted, such as paid
bank checks, these machines insert either a
55 fixed or a prespecified number of enclosures.
In such a fixed insertion machine, a plurality
of insert feeders disposed along a document
insertion track are activated for each machine
cycle, thereby feeding an enclosure for each
60 piece of mail processed. Other types of ma-
chines are operable for reading an indicia pro-
vided on a control document, the indicia spe-
cifying, among other information, which of a
plurality of inserts are to be fed for inclusion
65 with the associated statement.

As may be appreciated, such systems do
not provide a means for optimizing the num-
ber or type of included enclosures as to such
criteria as weight, and hence postage cost,
70 and other factors. Inasmuch as the reduction
of postal mailing costs is often an important
goal of the users of insertion systems, the
systems of the prior art may not be suitable
for such applications where the optimization of
75 enclosure selection and reduced postal mailing
costs are important goals.
In an attempt to achieve this goal of reduc-
ing postal costs, it has been known in the
prior art to provide an inserting machine
80 wherein the per item weight of the inserts
held at a plurality of feeding stations is stored
in a data processing memory. A processing
means, using the stored per item weights,
thereby calculates a total weight based on the
85 number of inserts selectively fed from the
feeding stations. This calculated weight is then
utilized to determine which one of a plurality
of postage meters, each being set to apply
postage relating to a different weight categ-
90 ory, will be subsequently activated to apply
postage to the envelope. Such a system is
disclosed in U.S. Patent No. 4,561,925, is-
sued on February 25, 1986 to Jerryl Adams.
A problem may, however, be created in the
95 use of such a system in that the per item
weight entered for a particular insert may be
an average weight for such an insert. As is
well known, there is associated with the indi-
vidual members of any group of similar items,
100 such as advertising inserts of bank checks, a
range of weights depending on the tolerances
associated with the physical characteristics of
these items. Differences in dimensions or the
type of paper stock utilized, which differences
105 may vary from lot to lot, will affect the actual
weight of each item. In addition, environmen-
tal factors such as humidity will affect the
weight of a document. Thus, the per item
weight entered may be an average weight and
110 may not reflect the actual weight to the item,
thereby resulting in the calculated weight be-
ing in error. Such an error may result in the
application of an excessive amount of postage
to some envelopes or an insufficient amount
115 of postage to others. In the case of the appli-
cation of insufficient postage, additional costs
may be incurred im reprocessing such mail in
order to apply the correct postage amount.
Furthermore, the use of such a system does
120 not address the significant problem of optimiz-
img the number of the included inserts in or-
der to achieve the full benefit of the postage
category into which the envelope falls. Neither
does such a system address the problem of
125 the selection of enclosures for insertion based
on criteria other than weight.
It has been known in the past to provide
apparatus to optimize the final weight of a
plurality of items such that the final weight is
130 substantially equal to a desired final weight.

However, such apparatus generally do not take into consideration any criteria except weight. For example, in the U.S. Patent No. 4,428,179, issued January 31, 1984 to C.

5 Wane Jordan and John W. Walker, there is disclosed a device for filling a package with a predetermined weight of items, such as pieces of chicken. The device, under the control of a computer, determines which of several pieces

10 of chicken held in a plurality of holding bins should be added to a partially filled package of chicken in order to bring the final weight of that package up to the predetermined final weight. In order to determine which one or

15 ones of the pieces of chicken should be added, each holding bin is provided with a weighing means to determine the individual weight of each such piece of chicken so held. Thus, the piece or pieces which will most

20 closely approach the desired final weight are selected for inclusion within the package.

Other U.S. Patents which describe means to arrive at a predetermined final weight when packaging items, such as cookies or bacon,

25 are Nos. 4,545,179, 4,209,960, 4,141,442, 4,136,504, and 4,065,911.

In these U.S. Patents set forth above the sole criteria for including an item within the package is item weight, the individual items

30 being, in general, of a fungible nature.

It is an aim of the present invention to provide an insertion machine capable of intelligent selection of one or more enclosures from a plurality of various enclosure types. The selec-

35 tion may be based on postage and other application specific requirements, such as the significance or priority of an enclosure relative to a particular customer. It is another aim to optimise the total. Final weight of the mail-

40 piece is optimized to realize the full value of a postage category, by appropriate selection of enclosures.

It is a further aim of the invention to provide an insertion machine or method which

45 utilizes the maximum weight tolerance for each enclosure in order to calculate a true total weight for a mail piece.

An inserting machine as disclosed herein provides for the intelligent selection of enclo-

50 sures, or inserts, based upon a maximum weight of each enclosure and an application definition.

In an illustrative embodiment an inserting machine has a plurality of document feeders

55 disposed along a transport deck for selectively feeding a bank statement, customer checks, and other enclosures thereto. A plurality of document pushers attached to an endless loop conveying chain are operable for collating the

60 documents so fed and conveying them to an envelope inserting and sealing machine, from which the sealed envelope is conveyed to a printing device, such as a postage meter, to have the appropriate postage applied.

65 A processing means may be provided for

selectively activating the document feeders, and especially the enclosure feeders, to feed enclosures based upon maximum enclosure weight and a specific application definition.

70 Such an insertion machine is operable for maximizing the number and type of enclosures fed such that the final weight of the stuffed envelope is optimized to realize the full value of a postage category into which the stuffed

75 envelope falls. Such an insertion machine is further operable to drive an electronically programmable postage meter or other means postage application, such as a manifest type of device, to apply the correct value of pos-

80 tage to each stuffed envelope, thereby elimi-nating the requirement of the prior art inser-tion machines to provide multiple postage meters.

Such an insertion machine is further oper-

85 able for selecting an insert for insertion within an envelope based on a predefined level of significance, or priority, associated with the in-sert, as well as upon the maximum weight of the insert. The levels of significance may fur-

90 ther be varied "on the fly," that is, the levels may be varied based on parameters related to a particular mailpiece such as the number of checks enclosed, other account types which the customer maintains or even by address or

95 zip code.

The above mentioned and other features of the invention will become better understood with reference to the following detailed de-scription when taken in conjunction with the

100 accompanying drawings in which:

Fig. 1 is a block diagram of an electronic postal mailing system having one embodiment of the invention;

Fig. 2 is a flow chart depicting an enclosure

105 sorting procedure in accordance with the in-vention; and

Fig. 3 is a flow chart depicting an enclosure selection procedure in accordance with the in-vention.

110 Referring now to Fig. 1 there is shown a portion of a multistation inserting system 10 having an embodiment of the invention. Al-though the system 10 as shown in

Fig. 1 is adapted for use in a banking appli-

115 cation, it should be realized that this is an illustrative embodiment only, and that the method of the invention is well suited for use with a variety of different inserting systems including, but not limited to, billing systems

120 and systems adapted for the mass mailing of advertising literature and the like. The system is also usable outside of the mailing field in any application wherein the topping off of a final weight is desired and selectable inser-

125 tions have different priorities.

In general, system 10 operates to feed do-cuments from a plurality of document feeders onto a transport deck, the documents being conveyed down the deck to an envelope

130 feeder and insertion station where the collated

documents are inserted within an envelope. Thereafter the envelope is sealed and conveyed to a postage meter where a correct amount of postage is applied. The system, in
5 this illustrative embodiment, is operable for reading an indicia provided on a control document which is also conveyed upon the deck, the indicia being indicative, among other things, of which inserts from a plurality of insert
10 stations are to be included within a particular envelope. Controlling the operation of the document feeders in response to the indicia is a system processing unit. The processing unit is also operable for determining the correct
15 amount of postage for each stuffed envelope and for providing by a suitable communications means the postage information to the postage meter. The meter is comprised of a printer, such as an ink jet printer, operable for
20 printing a postmark or postage indicia indicative of differing postage amounts upon each successive stuffed envelope depending upon the weight of the stuffed envelope. Such an indicia may take the form of a graphical pat-
25 tern or a bar code or some other type of approved pattern for representing the dollar amount of the postage and other information, such as a level of presort or a level of significance (or priority), etc.
30   As may be seen more specifically in Fig. 1 a plurality of document collations 12a through 12f are disposed upon the surface of a transport deck 14 and are transported thereon in a direction indicated by the arrow 16. The
35 collations 12 may be transported by a plurality of document pushers (not shown) which extend upwards through the deck 14, the pushers being attached to an endless loop conveying chain (not shown) disposed beneath deck
40 14. Each of the collations 12a through 12f may be comprised of a different number of documents and document types, the document types being inserts fed from a plurality of insert feeders 18, a statement fed from
45 feeder 20, and bank checks fed from check feeder 22. As may be appreciated, collation 12a will generally be comprised of one or more inserts fed from feeder 18a, while collation 12b may be comprised of two or more
50 inserts fed from feeder 18a and feeder 18b. Collation 12c may be comprised of three or more inserts, and so on.
     Collation 12f, also ref erred to herein as a final collation, is comprised of a bank state-
55 ment fed from feeder 20 and some variable nunber of checks fed from feeder 22. In addition, collation 12f may be comprised of one or more inserts fed from feeders 18a through 18d. Final collation 12f is transported to an
60 envelope feeder and inserter 24, where it is inserted, or stuffed, within an envelope. The operation of inserter 24 subsequently seals the stuffed envelope 26 which is thereafter conveyed to a postage printing device such as
65 postage meter 28 to have a postage indicia

30 applied thereto. The postage metered envelope 32 will thereafter be transported to other, unillustrated portions of the system 10 where it may be sorted according to zip code
70 and stacked for mailing.
     Control of the operation of system 10 is provided by a control unit, which may be comprised of a central processing unit (CPU) 34. CPU 34, which may be a microcomputer,
75 has a plurality of inputs and outputs (only some of which are shown in Fig. 1) for inputting document related data and for controlling the various document feeders, the inserter and the postage meter.
80   As may be seen in Fig. 1, there is connected to CPU 34, in this embodiment of the invention, a photosensor 36 having an output 38. Photosensor 36 is disposed relative to deck 14 such that it may sense an indicia 40
85 provided on a control document 42, the indicia being read by CPU 34 via output 38. Typically, one such control document 42 is provided for each customer mailpiece, the indicia 40 being indicative of, for example, the num-
90 ber of returned checks to be fed by feeder 22, which ones of the inserts contained in feeders 18a through 18d are to be included within the mailpiece and additionally, enclosure significance data. As may be appreciated, in
95 other embodiments of the invention such information may be provided to CPU 34 in a variety of different ways, such as by a direct communications link to a central electronic data processing (EDP) computer.
100   Also connected as an input to CPU 34 is a data entry device 44, the device 44 being connected via a suitable cable 46. The data entry device 44, which may be an operator actuated keyboard or a separate EDP system,
105 functions, in accordance with the invention, to enter enclosure significance data and a representation of enclosure maximum weight data into CPU 34. The purpose and method of using this data will be discussed hereinafter.
110   In addition to the above described inputs, CPU 34 has a plurality of output lines 48 through 62 suitable for controlling the activation of the insert feeders 18, the statement feeder 20, the check feeder 22, the inserter
115 24 and the postage meter 28. For example, line 62 may be a serial data communications link operable for transmitting information expressive of a required value of postage to be applied by meter 28.
120   It should be realized that an insertion system of the type described above is operable for processing a plurality of individual mailpieces in a high speed and continous manner.
     Of particular interest to the instant invention
125 is the activation by CPU 34 of the insert feeders 18. As has been previously mentioned, in some systems of the prior art all of the feeders 18 would be activated for every customer mailpiece. Thus, no selectivity as to which in-
130 serts a particular customer would receive was

provided.

In other systems of the prior art which do provide for some selectivity as to insert selection, the selection of inserts would be predet-
5 ermined and provided to the system, typically, on the control document. In such a system only the feeders for the selected inserts would be activated during the collation of a mail-piece.
10   As may be appreciated, neither of the above mentioned types of systems of the prior art have the capability to modify the inserts selected during the actual processing of a particular mailpiece. Because of this defici-
15 ency the systems of the prior art also do not have the capability to optimize the final weight of the mailpiece in order to obtain the full value of a postage category.

Referring now to the flow charts of Figs. 2
20 and 3, there will be described a method of providing an inserting machine with the necessary decision making capability to make an intelligent determination as to which enclosures to include within a particular mailpiece,
25 the determination being based on an application definition.

In general, an application definition can be considered as a set of enclosures $(E_1, E2.. E_N)$, the set being comprised of an enclosure
30 E_1 to be fed from a feeder 1, and so on. The total number of potential enclosures, represented by N, includes the carrier, or mailing envelope. In this embodiment of the invention there are two attributes associated with each
35 enclosure, namely a level of significance (S), or priority, and a postage influencing characteristic, which in this embodiment is a maximum weight (W).

For example, the existing postal rate system
40 is based on twelve weight categories of 0.00 to 12.00 ounces. In inserting applications all weights over three ounces are considered as one category, therefore there are four weight categories of interest for this embodiment of
45 the invention. The categories of interest are 0.00 to 0.99 ounces, 1.00 to 1.99 ounces, 2.00 to 2.99 ounces and 3.00 ounces or greater. For the purposes of this discussion 3.0 0 ounces will be assigned the weight
50 threshold t_3, two ounces will be assigned the weight threshold t_2, and one ounce the weight threshold t_1, each such threshold being indicative of the point at which a different postage amount is required.
55   Based on the above described postal rate categorization, the levels of significance may be defined as follows:

   (a) $S = A$ when an enclosure must be inserted without reservation as to the total final
60 weight of the mailpiece,

   (b) $S = B$ when an enclosure should be inserted only if the total final weight of the mailpiece, including this enclosure, will not exceed t_3,
65   (c) $S = C$ when an enclosure should be

inserted only if the total final weight of the mailpiece, including this enclosure, will not exceed t_2, and

   (d) $S = D$ when an enclosure should be
70 inserted only if the total final weight of the mailpiece, including this enclosure, will not exceed t_1.

It should be realized, however, that the number of levels of significance is not limited
75 to four, in that a different postal rate categorization or other factors may result in more or less than four levels of significance being utilized for a particular application.

It should further be realized that the assign-
80 ment of particular level of significance to an enclosure may be based on a variety of application specific factors. For example, a particular enclosure may be assigned a significance level of D for certain of the bank's customers
85 and a level of B or C for certain other of the bank's customers. The differentiation between customers may be made in a variety of manners, such as by other types of banking accounts maintained by the customers, or the
90 average minimum balance maintained within such an account, or even by geographical location, such as indicated by the customer's zip code. For example, an encl osure describing a new type of money market account to
95 be offered by the bank may be considered to be of more significance to those of the bank's customers who already maintain money market accounts than to those of the bank's customers who only maintain a checking account.
100 Therefore, such an enclosure may be assigned a relatively high significance level of A or B for some customers and a relatively low significance level of D for certain other of the bank's customers. As may be appreciated,
105 such customer related information may be provided to the CPU 34 by the control document 42 or by any of a variety of suitable means. Thus, the level of significance of a particular enclosure may be dynamically varied
110 from one mailpiece processed to the next. In other words, the significance data entered via data entry device 44 may be modified by information contained on the control document 42. Thus the significance or priority of a
115 document may be altered "on the fly."

Inasmuch as the levels of significance are based on maximum weight thresholds, the levels are thereby also based on an amount of postage. An enclosure assigned to signifi-
120 cance level C will be deemed to have a higher priority than an enclosure assigned to a level of D since the dollar amount of postage associated with weight threshold t_2 is greater than that assigned to weight threshold t_1.
125   In accordance with the levels of significance described above, certain enclosures will by definition be considered level A enclosures. In the banking insertion machine of the illustrative embodiment, the bank statement, returned
130 customer checks, and the carrier envelope it-

self must all by necessity be included without
reservation as to the final weight of the mail-
piece. Additionally, one or more of the Inserts
held in feeders 18a through 18d may convey
5 important inf ormation applicable to all check-
ing account customers. As an example, such
an insert may give notification of a change in
checking account fees. Such an insert may be
considered to be of such general importance
10 that it is assigned to a significance level of A,
thereby being included with each mailpiece
without regard for the total final weight and
hence the postage cost of the mailpiece.
Others inserts held in feeders 18a through
15 18d may be considered to be of more limited
interest, and hence are not required to be in-
cluded in every mailpiece without reservation
as to postage cost. These various insert types
would theref ore be assigned to the remaining
20 significance levels, namely B, C or D.
As has been previously mentioned, the sec-
ond attribute of the two attributes associated
with each enclosure is the maximum weight of
the enclosure. More specifically, the second
25 attribute is the maximum possible weight
based on the maximum possible deviation
from the average weight. For example, if the
average weight of a check Is assumed to be
0.1 ounce, ten such checks may be assumed
30 to weigh 1.0 ounce. If, however, the possible
deviation, or weight tolerance, of each check
is 0.01 ounces, ten such checks could weigh
in the range of 0.9 to 1.1 ounce. Ten such
checks included with a statement, carrier en-
35 velope, and inserts may result in the final
mailpiece weighing in excess of say, two
ounces, when the calculated weight of the
mailpiece, based on the average weight, is
calculated to be less than two ounces. Thus,
40 the mailpiece may be metered with an insuffi-
cient amount of postage, thereby creating the
possibility that additional costs will by incurred
in reprocessing such incorrectly metered mail.
In order to overcome this problem the use
45 of the invention provides for utilizing the maxi-
mum possible weight of each enclosure during
the calculations which will be described more
fully hereinafter. The maximum possible
weight may be entered directly via the data
50 entry device 44, or an average or nominal
weight may be entered along with the maxi-
mum possible deviation from the nominal
weight. If the latter type of data entry is uti-
lized, CPU 34 will compute the maximum pos-
55 sible weight of each particular enclosure.
In addition, the significance level of each en-
closure, namely A, B, C or D, is entered via
device 44. Such data entry may be accom-
plished in a variety of ways, such as by an
60 operator keypad or by a separate data pro-
cessing computer. Yet another way to enter
such significance data is to assign the levels
to predefined document feeders.
The method of the invention is substantially
65 accomplished through the use of a sorting and

a selecting procedure as illustrated in the flow
charts of Figs. 2 and 3. It should be realized
however, that the procedures as illustrated in
Figs. 2 and 3 are representative only and that
70 a possibly large nunber of alternative sorting
and selecting procedures may be devised by
those skilled in the art. Hence, the method of
the invention should not be considered to be
limited to tne procedures depicted in the
75 flowcharts of Figs. 2 and 3.
Referring now to Fig. 2, a first procedure is
shown wherein all potential enclosures (E) are
sorted into four groups, namely:
(a) E_{i1}, E_{i2}, ... E_{in};
80 (b) E_{j1}, E_{j2}, ... E_{jm};
(c) E_{k1}, E_{k2}, ... E_{kp}; and
(d) E_{11}, E_{12}, ... E_{1q}.
These groups are representative of enclo-
sures of Class A, Class B, Class C and Class
85 D, respectively.
For each mailpiece processed there is en-
tered the significance (S) and the maximum
weight (W) of each enclosure, block 70. As
has been previously mentioned, such data may
90 be entered by an operator actuated keyboard
or some other suitable manner. The total num-
ber of entries so made is assigned the value
N. After the step of data entry, all variable
parameters and the total weight of all Class A
95 enclosures are initialized to zero, block 72.
Thereafter, a counter value, represented by h,
is incremented by one, block 74, and at block
76 the value of h is compared to N. If h is
greater than N, N being the total number of
100 enclosure entries made at block 70, then the
enclosure sorting method of FIG. 2 is halted
at block 78. If h is equal to or less than N,
the method next determines at block 80 if the
value of S associated with this enclosure indi-
105 cates that the enclosure is a Class A enclo-
sure. If S is not equal to A, another compari-
son is made at block 82 to determine is S is
equal to B. If S is not equal to B, S is com-
pared to C at block 84. If S is not equal to C,
110 one further comparison is made at block 86
to determine if S is equal to D. In the event
that an error occurred during the data entry
procedure of block 70 such that the signifi-
cance of an enclosure does not correspond to
115 any of the four recognized significance levels
A, B, C or D, a suitable error process is per-
formed at block 88 after which the program
returns to block 74 in order to process the
next enclosure.
120 Referring once more to block 80, if the sig-
nificance of an enclosure is determined to be
of level A, a counter having a value of (a) is
incremented by one at block 90, thereby
maintaining a count of the total number of
125 Class A enclosures. Next, at block 92, the
position of the enclosure within the list of en-
closures is assigned according to the current
value of h. As an example, if the seventh
enclosure being processed is also the third
130 Class A enclosure processed then E_{i3} would

equal E_{73}, which enclosure would be identified
as seventh on the list of entered enclosures.
In addition, at block 92 the total weight of the
Class A enclosures would be increased by the
5 maximum weight of the current enclosure,
such that at the completion of the sorting pro-
cess, block 78, the maximum total weight of
all Class A emclosures (TWA) for the mail-
piece is known. Thereafter the program reen-
10 ters block 74 in order to process the next
enclosure on the list of entered enclosures.
If an enclosure is determined, at block 82,
to be a Class B enclosure the Class B counter
(b) is incremented by one at block 94. At
15 block 96 the value of h is assigned to jm,
which value then is indicative of the position
of this enclosure in the list of all enclosures of
Class B. The program next reverts to block
74 to process the next enclosure on the list.
20 The operation of blocks 98 and 100, and 102
and 104, are similar for those enclosures iden-
tified as Class C and Class D enclosures, re-
spectively.
At the completion of the sorting procedure
25 as illustrated by Fig. 2, all potential enclosures
will have been sorted into the aforementioned
four categories. In addition, the maximum total
weight of all Class A enclosures (TWA) will
be known as will the number of enclosures
30 within each category, as represented by the
values assigned to n, m, p and q.
At the completion of the sorting procedure
of Fig. 2 it is necessary to determime which
of the inserts will be selected for insertion
35 within a mailpiece. One goal of the selection
procedure, it should be remembered, is to op-
timize the final weight of the mailpiece to real-
ize the full value of a postal category.
Referring now to Fig. 3, there is shown a
40 flow chart of this enclosure selection process.
At Block 110 the selection procedure is
started. At this time all those enclosures iden-
tified as Class A enclosures will have already
been selected for inclusion within the mail-
45 piece, it being recalled that Class A enclosures
are inserted without regard to the final weight
of the mailpiece. In the instant exampl e, the
bank statement, cancelled checks, carrier en-
velope and, possibly, certain ones of the in-
50 serts will thus already be designated for inser-
tion within the mailpiece.
At block 112 a counter designated as r is
reset to zero and a variable which is represen-
tative of the total weight (TW) of the mail-
55 piece is assigned the value TWA, TWA hav-
ing been calculated at block 92 in the flow
chart of FIG. 2 to be the maximum total
weight of all Class A enclosures.
At block 114 r is incremented and at block
60 116 compared to the total number, repre-
sented by m, of all Class B enclosures. If r is
less than or equal to m then there still re-
mains at least one Class B enclosure within
the list of B enclosures. If r is greater than m,
65 then all of the Class B enclosures have been

tested for inclusion within the mailpiece and
processing continues for the Class C enclo-
sures. If there are remaining Class B enclo-
sures processing continues to block 118
70 where the maximum weight of the current
Class B enclosure (Wjr) is added to the cur-
rent total weight (TW) of the mailpiece. At
block 120 this tentative total weight is com-
pared to threshold t_3, which in this example is
75 3.00 ounces. If the tentative total weight ex-
ceeds t_3 then processing continues to block
122, where the total weight is adjusted down-
wards by the weight to the Class B enclosure
added at block 118. Since the inclusion of
80 this particular Class B enclosure would exceed
the threshold t_3, the enclosure is not selected
for the inclusion and processing resumes at
block 114. If the tentative total weight is de-
termined, at block 120, to be less than
85 threshold t_3 then the enclosure is selected for
inclusion at block 124, afterwhich processing
continues at block 114. The enclosure proce-
dure, shown as block 124, may involve in-
cluding the document feeder which contains
90 this enclosure within a list of feeders to be
activated during the processing of this particu-
lar mailpiece.
Returning to block 116, when it is deter-
mined that all Class B enclosures have been
95 examined for possible inclusion within the
mailpiece a test is made at block 126 to de-
termine if the maximum total weight (TW) of
the mailpiece thus far is less than threshold t_2,
or two ounces in this example. If TW is de-
100 termined to be greater than t_2 the enclosure
selection process is halted at block 128. At
this time, the document feeders selected for
activation may be energized and the mailpiece
processed by the system 10.
105 If at block 126 it is determined that TW is
less than t_2, then those enclosures belonging
to C1 ass C are sequemtially tested to deter-
mime which, if any, may be included within
the mailpiece without excpeding the weight
110 threshold t_2. This testing procedure is indi-
cated by blocks 132 through 142, which per-
form in a similar fashion to the blocks 114 to
124.
Referring to block 134, when it is deter-
115 mined that all of the Class C enclosures have
been tested for possible inclusion within the
mailpiece a further test is made at block 144
to determine if the TW of the mailpiece thus
far is less than threshold t_1, or one ounce in
120 this example. If TW is less than t_1, the list of
Class D enclosures is sequentially tested to
determine which, if any, of the Class D enclo-
sures may be included within the mailpiece
without exceeding the t_1 threshold. The Class
125 D selection procedure is indicated by the
blocks 148 through 160, which operate in a
similar fashion to the blocks 130 through 142
and 112 through 124.
Referring to Block 152, when it is deter-
130 mined that all of the Class D emclosures have

been tested for possible inclusion within the
mailpiece, the selection process halts at block
162. As has been previously mentioned, at
the completion of the enclosure selection pro-
5 cess of Fig. 3, those enclosures selected will
be included within the mailpiece by selectively
activating their respective document feeders.
In accordance with the method and system
of the embodiment of the invention shown in
10 Figs. 2 and 3, it can be seen that a final
mailpiece will be comprised of all Class A en-
closures and, in addition, those Class B, C
and D enclosures which do not exceed their
respective maximum weight thresholds. There-
15 fore, the method of the invention allows for
optimizing the final weight or a mailpiece so
as to realize the full value of a postage categ-
ory. Such a weight optimization, or "topping
off", procedure results in increased efficiency
20 and financial savings.
For example, if the final total weight of a
mailpiece containing Class A enclosures is 2.2
ounces, the mailpiece must be metered with
an amount of postage corresponding to
25 threshold t_2. The mailpiece may, however,
contain an additional 0.79 ounces of weight
without exceeding threshold t_2. Thus, the
method of the invention allows for selecting
one or more Class B enclosures for inclusion
30 within the mailpiece in order to realize the full
value of the postage required for threshold t_2.
It should be realized that the above de-
scribed embodiment of the invention may be
modified in a variety of ways and those modi-
35 fications would still be within the Applicants'
invention. For example, one such modification
may be controlling the system by some other
means than by the control document, such as
by counting the checks as they are fed until a
40 check divider document is encountered, as is
well known in the art. As another example,
the Class A emclosures may be fed, collated,
and conveyed to a weighing station. The ac-
tual weight may then be compared to the vari-
45 ous weight thresholds to determine which, if
any, of the enclosures of Class B, C or D may
be added to the collation to bring up the
weight to the maximum allowable weight for a
particular postage category. Thus, while this
50 invention has been disclosed by means of a
specific, illustrative embodiment, the principals
thereof are capable of a wide range of modifi-
cation by those skilled in the art within the
scope of the following claims.
55

CLAIMS
1. A method of topping off the final weight
of a mailpiece, the mailpiece being comprised
of one or more enclosure types, such that the
60 final weight is substantially equal to a maxi-
mum allowable weight threshold of a postage
category, the category being indicative of a
range of weight, the category further being
indicative of a required value of postage, com-
65 prising the steps of:

assigning to each of the enclosure types an
attribute representative of at least a first or a
second level of priority, the level of priority
being based at least on a postage category;
70 assigning to each of the enclosure types an
attribute representative of a per emclosure
maximum possible weight;
sorting the enclosure types into groups,
each group being comprised of enclosure
75 types having an identical priority level attribute
assigned thereto whereby each group has the
priority level attribute associated therewith;
determining from the level of priority associ-
ated with each group which, if any, of the
80 groups must be provided for the mailpiece
without regard for the required value of pos-
tage;
determining an initial maximum total weight
of the mailpiece due to the per item maximum
85 weight attribute of each of the enclosure
types of a group which must be so provided
whereby the mailpiece is assigned to a given
postage category;
determining the difference in weight, if any,
90 between the initial maximum total weight of
the mailpiece and a maximum allowable
weight threshold of the given postage categ-
ory; and
selecting individual enclosures to be pro-
95 vided for the mailpiece, the individual enclo-
sures being selected from a group having a
level of priority which is equal to or greater
than the given postage category, the individual
ones being selected such that the per enclo-
100 sure maximum weight, when added to the ini-
tial maximum weight, yields a final maximum
weight which is substantially equal to the
maximum allowable weight threshold of a pos-
tage category.
105 2. A method of selectively determining rela-
tive to a value of postage which ones of a
plurality of different enclosure types are to be
provided by a mailing system for inclusion
within a mailpiece, the system comprising a
110 processing unit operable at least for having
emclosure related data entered therein and
also for selectively activating individual ones
of a plurality of enclosure feeding stations for
feeding individual ones of an enclosure type
115 contained therein, the method comprising the
steps of:
entering data into the processing unit indica-
tive of a level of significance relative to a
value of postage associated with each of the
120 enclosure types;
entering data into the processing unit indica-
tive of a maximum amount of a postage influ-
encing characteristic associated with each of
the enclosure types; and
125 selecting individual ones of the plurality of
enclosure types to be provided for inclusion
within the mailpiece based upon a determina-
tion of the level of significance and the pos-
tage influencing characteristic associated with
130 each enclosure type whereby a final postage

influencing characteristic of the mailpiece is
optimized such that substantially all of the
value of an amount of postage required for
the mailpiece is realized.

5   3. The method of Claim 2 wherein the pos-
tage influencing characteristic is a maximum
weight.
4. The method of Claim 2 further compris-
ing the step of selectively activating individual
10 ones of the enclosure feeding stations, as de-
termined by the step of selecting, to feed indi-
vidual ones of the enclosure type contained
therein for inclusion within the mailpiece.
5. A method of optimizing the final weight
15 of a mailpiece being comprised of one or
more enclosures such that substantially all of
the value of a required postage amount is re-
alized, comprisimg the steps of:
assigning a level of significance relative to
20 an amount of postage to each enclosure;
determining the maximum weight of each
enclosure; and
selecting for inclusion within the mailpiece
individual ones of the enclosures, the selecting
25 being based on the level of significance and
the maximum weight of each enclosure
whereby the final weight of the mailpiece is
made to be substantially equal to the maxi-
mum total weight allowed for the value of the
30 required postage amount.
6. A method of optimizing the final weight
of a mailpiece such that the substantially all of
the value of a required postage amount is re-
alized, the mailpiece beimg comprised of one
35 or more required enclosures and possibly one
or more optional enclosures, comprising the
steps of:
assigning a level of significance to each en-
closure relative to an amount of postage;
40 determining the maximum weight of each
enclosure;
determining an initial maximum weight of the
mailpiece due to the maximum weight of the
required enclosures;
45 determining a required value of postage due
to the initial maximum weight of the mailpiece;
determining an additional amount of weight,
if any, which may be added to the initial maxi-
mum weight without exceeding the required
50 value of postage; and
selecting, if required, one or more optional
enclosures which have a total maximum
weight substantially equal to the determined
additional amount of weight whereby the final
55 maximum weight of the mailpiece is optimized
such that substantially all of the value of the
required postage is realized.
7. The method of Claim 6 wherein the step
of selecting is accomplished by utilizing the
60 level of significance and the maximum weight
of each enclosure.
8. A mailing system having a processing
unit operable for selectively activating indivi-
dual ones of a plurality of enclosure feeding
65 stations for feeding individual ones of an en-

closure type contained therein for insertion
within a mailpiece, said mailpiece subsequently
being postmarked with an amount of postage
determined by a postage influencing character-
70 istic of said mailpiece, the system further
comprising:means for entering emclosure re-
lated data for a mailpiece into said processing
unit, said data at least being indicative of a
level of significance and of a maximum
75 amount of a postage influencing characteristic
associated with each of said enclosure types;
and
means for selecting individual ones of said
enclosure feeding stations for activation, said
80 means for selecting being responsive to said
entered data for optimizing the postage influ-
encing characteristic of said mailpiece whereby
the full value of said amount of postage is
realized.
85 9. The mailing system of Claim 8 wherein
said postage influencing characteristic is a
maximum weight.
10. A method of selectively determinimg
relative to a value of postage which ones of a
90 plurality of different enclosure types are to be
provided by a mailing system for inclusion
within individual ones of a plurality of mail-
pieces, the system comprising a processing
unit operable at least for having enclosure re-
95 lated data entered therein and also for selec-
tively activating individual ones of a plurality of
enclosure feeding stations for feeding indivi-
dual ones of an enclosure type contained
therein, the method comprising the steps of:
100 (a) entering data into the processing unit in-
dicative of a level of significance relative to a
value of postage associated with each of the
enclosure types;
(b) entering data into the processing unit in-
105 dicative of a maximum amount of a postage
influencing characteristic associated with each
of the enclosure types;
(c) optionally entering additional data into
the processing unit indicative of a level of sig-
110 nificance modifying characteristic whereby the
significance data entered at step (a) may be
modified; and
(d) selecting individual ones of the plurality
of enclosure types to be provided for inclusion
115 within the mailpiece based upon a determina-
tion of the level of significance or the modified
level of significance and the postage influenc-
ing characteristic associated with each enclo-
sure type whereby a final postage influencing
120 characteristic of the mailpiece is optimized
such that substantially all of the value of an
amount of postage required for the mailpiece
is realized.
11. The method of Claim 10 wherein the
125 postage influencing characteristic is a maxi-
mum weight.
12. The method of Claim 10 further com-
prising the step of selectively activating indivi-
dual ones of the enclosure feeding stations, as
130 determined by the step of selecting, to feed

individual ones of the enclosure type con-
tained therein for inclusion within the mail-
piece.

13. A method of optimizing the final weight
5 of each mailpiece of a plurality of mailpieces
such that the substantially all of the value of a
required postage amount is realized, each of
the mailpieces being comprised of one or
more required enclosures and possibly one or
10 more optional enclosures, comprising the
steps of:
    dynamically assigning for each mailpiece a
level of significance for each enclosure relative
to an amount of postage;
15   determining the maximum weight of each
enclosure;
    determining an initial maximum weight of
each mailpiece due to the maximum weight of
the required enclosures;
20   determining a required value of postage due
to the initial maximum weight of each mail-
piece;
    determining an additional amount of weight
if any, which may be added to the initial maxi-
25 mum weight without exceeding the required
value of postage; and
    selecting, if required, one or more optional
enclosures which have a total maximum
weight substantially equal to the determimed
30 additional amount of weight whereby the final
maximum weight of each mailpiece is optim-
ized such that substantially all of the value of
the required postage for each mailpiece is re-
alized.
35   14. The method of Claim 13 wherein the
step of selecting is accomplished by utilizing
the dynamically assigned significance and the
maximum weight of each enclosure.

15. An inserting machine substantially as
40 herein described with reference to and as illus-
trated in the accompanying drawings.

16. A mailing system substantially as de-
scribed herein with reference to and as illus-
trated in the accompanying drawings.
45   17. A method of optimising the final weight
of a mail piece substantially as herein de-
scribed with reference to and as illustrated in
the accompanying drawings.

18. A method of topping up the final weight
50 of a mailpiece substantially as herein described
with reference to and as illustrated in the ac-
companying drawings.

19. Any novel combination or sub-combina-
tion discolosed and/or illustrated herein.